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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/997,134	11/29/2001	Richard C. Odom	CLG 99-002	3399

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EXAMINER	
TSAI, CAROL S W	

ART UNIT	PAPER NUMBER
2857	

DATE MAILED: 06/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/997,134	ODOM ET AL.	
	Examiner	Art Unit	
	Carol S Tsai	2857	

-- The MAILING DATE of this communication appears on the c ver sheet with the correspondence address --

Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 November 2001 .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-29 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-29 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, and 4-7 are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 4,825,071 to Gadeken et al.

Gadeken et al. disclose a method for determining a property of a material, comprising the steps of: (a) inducing, within said material, gamma radiation comprising energies greater than about 3 MeV (see col. 3, lines 18-29 and col. 5, lines 44-46); (b) measuring a first gamma ray spectrum and a second gamma ray spectrum resulting from said induced gamma radiation (see col.. 3, lines 36-61); (c) normalizing said first and said second gamma ray spectrum in a first energy region; (d) measuring down scatter gamma radiation in a second energy region of said normalized first and second gamma ray spectra; and (e) determining said property from said measure of down scatter radiation (see col. 4, lines 38-58).

As to claim 2, Gadeken et al. also disclose forming said induced gamma radiation by means of a neutron source (see col. 3, lines 18-29).

As to claim 4, Gadeken et al. also disclose property being bulk density (see col. 5, line 33 to col. 6, line 18).

As to claim 5, Gadeken et al. also disclose material being earth formation penetrated by a borehole (see col. 3, lines 10-11).

As to claim 6, Gadeken et al. also disclose measuring said property as a function of depth within said borehole by conveyance of apparatus along said borehole by means of a wireline (see col. 3, lines 18-35).

As to claim 7, Gadeken et al. do not disclose expressly measuring said property as a function of depth within said borehole by conveyance of apparatus along said borehole by means of a drill string.

It is, however, considered inherent that Gadeken et al. measuring said property as a function of depth within said borehole by conveyance of apparatus along said borehole by means of a drill string (see col. 11, lines 16-25), because such element is known to be necessary in order that the drill bit forms the borehole through earth formations as the drill string and the bottom hole assembly turn.

3. Claims 8, 9, 11, 13-19, 21, and 24-26 are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 3,864,569 to Tittman.

With respect to claims 8, 11, 13, 18, and 19, Tittman discloses an apparatus for measuring a property of a material, comprising: (a) a neutron source (see col. 2, lines 40-41 and col. 3, lines 49-54); (b) a first gamma ray spectrometer displaced from said source at a first axial spacing and which measures a first gamma ray spectrum resulting from gamma radiation induced within said material by said neutron source and (c) a second gamma ray spectrometer displaced from said source at a second axial spacing and which measures a second gamma ray spectrum resulting from said gamma radiation induced within said material by said neutron source (see col. 2, lines 42-56 and col. 3, line 65 to col. 4, line 53); and (d) a processor for (i) normalizing said second gamma ray spectrum to said first gamma ray spectrum in a first energy region

thereby creating a normalized second gamma ray spectrum and (ii) combining said first gamma ray spectrum with said normalized second gamma ray spectrum in a second energy region to determine a measure of said property (see col. 2, lines 56-63 and col. 5, line 60 to col. 7, line 7).

As to claim 9 and 21, Tittman also discloses said second spacing is greater than said first spacing (see col. 2, lines 50-51 and col. 4, lines 25-33).

As to claim 14, Tittman also discloses (a) identifying one or more elements within said material from said first gamma ray spectrum and said second gamma ray spectrum (see col. 2, lines 42-56 and col. 3, line 65 to col. 4, line 53); (b) determining lithology of said material from said one or more elements and (c) correcting said measure of bulk density for effects of said lithology of said material (see col. 6, line 36 to col. 7, line 7).

As to claims 15 and 24, Tittman also discloses said material being earth formation penetrated by a borehole (see col. 3, lines 15-25).

As to claims 16 and 25, Tittman also disclose conveying apparatus used to obtain said measure of said property within said borehole by means of a wireline (see col. 3, lines 19-25).

As to claims 17 and 26, Tittman does not disclose expressly conveying apparatus used to obtain said measure of said property within said borehole by means of a drill string.

It is, however, considered inherent that Tittman obtains said measure of said property within said borehole by means of a drill string (see col. Col. 1, line 61 to col. 2, line 2 and col. 3, lines 26-33), because such element is known to be necessary in order that the drill bit forms the borehole through earth formations as the drill string and the bottom hole assembly turn.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gadeken et al. in view of U. S. Patent No. 3,864,569 to Tittman.

As noted above, Gadeken et al. disclose the claimed invention, except for a) said first gamma ray spectrum is measured at a first distance from said neutron source; (b) said second gamma ray spectrum is measured at a second distance from said neutron source wherein said second distance is greater than said first distance; (c) said first energy region comprises gamma radiation with energy greater than gamma radiation in said second energy region; (d) said second gamma ray spectrum is normalized to said first gamma ray spectrum thereby forming a normalized second gamma ray spectrum; and (e) said property is determined from a difference in said down scatter radiation in said second energy regions of said first gamma ray spectrum and said normalized second gamma ray spectrum.

Tittman teaches a) said first gamma ray spectrum is measured at a first distance from said neutron source (see col. 2, lines 42-49 and col. 3, line 65 to col. 4, line 8); (b) said second gamma ray spectrum is measured at a second distance from said neutron source wherein said second distance is greater than said first distance and (c) said first energy region comprises gamma radiation with energy greater than gamma radiation in said second energy region (see col. 2, lines 50-56 and col. 4, lines 25-53); (d) said second gamma ray spectrum is normalized to said first

gamma ray spectrum thereby forming a normalized second gamma ray spectrum; and (e) said property is determined from a difference in said down scatter radiation in said second energy regions of said first gamma ray spectrum and said normalized second gamma ray spectrum (see col. 2, lines 56-63 and col. 5, line 60 to col. 7, line 7).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gadeken et al.'s method to include a) said first gamma ray spectrum is measured at a first distance from said neutron source; (b) said second gamma ray spectrum is measured at a second distance from said neutron source wherein said second distance is greater than said first distance; (c) said first energy region comprises gamma radiation with energy greater than gamma radiation in said second energy region; (d) said second gamma ray spectrum is normalized to said first gamma ray spectrum thereby forming a normalized second gamma ray spectrum; and (e) said property is determined from a difference in said down scatter radiation in said second energy regions of said first gamma ray spectrum and said normalized second gamma ray spectrum, as taught by Tittman, in order to produce output signals that correspond to a characterizing parameter of the mudcake and the average atomic number of the formation (see Tittman, col. 2, lines 60-63).

6. Claims 10 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tittman in view of Re. 36,012 to Loomis et al.

As noted above, Tittman discloses the claimed invention, except for (a) said first energy region ranges from about 3 MeV to about 7 MeV; and (b) said second energy region ranges from about several hundred keV to about 3 MeV.

Loomis et al. teach (a) said first energy region ranges from about 3 MeV to about 7 MeV; and (b) said second energy region ranges from about several hundred keV to about 3 MeV (see col. 8, lines 53-54).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Tittman's method to include (a) said first energy region ranges from about 3 MeV to about 7 MeV; and (b) said second energy region ranges from about several hundred keV to about 3 MeV, as taught by Loomis et al., in order that gamma rays emitted by the radioactive material can be detected.

As to claim 22, Tittman discloses said first gamma ray spectrum in said second energy region is subtracted from said normalized second gamma ray spectrum in said second energy region to determine said measure of said property (see col. 2, lines 56-63 and col. 5, line 64 to col. 7, line 7).

Tittman does not disclose (a) said first energy region ranges from about 3 MeV to about 7 MeV; (b) said second energy region ranges from about several hundred keV to about 3 MeV.

Loomis et al. teach (a) said first energy region ranges from about 3 MeV to about 7 MeV; (b) said second energy region ranges from about several hundred keV to about 3 MeV (see col. 8, lines 53-54).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Tittman's method to include (a) said first energy region ranges from about 3 MeV to about 7 MeV; (b) said second energy region ranges from about several hundred keV to about 3 MeV, as taught by Loomis et al., in order that gamma rays emitted by the radioactive material can be detected.

7. Claims 12 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tittman in view of U. S. Patent No. 5,767,510 to Evans.

As noted above, with respect to claims 12 and 23, Tittman discloses the claimed invention, except for said neutron source comprises Californium-252.

Evans teaches said neutron source comprises Californium-252 (see col. 9, line 65 to col. 10, line 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Tittman's method to include said neutron source comprises Californium-252, as taught by Evans, in order to emit fast neutrons.

8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tittman in view of U. S. Patent No. 4,825,071 to Gadeken et al.

As noted above, Tittman discloses the claimed invention, except for said induced gamma radiation comprises energies greater than about 3 MeV.

Gadeken et al. teach said induced gamma radiation comprises energies greater than about 3 MeV.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Tittman's method to include said induced gamma radiation comprises energies greater than about 3 MeV, as taught by Gadeken et al., in order that gamma rays emitted by the radioactive material can be detected.

9. Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 3,864,569 to Tittman in view of Re. 36,012 to Loomis et al.

With respect to claims 27-29, Tittman discloses a method for determining bulk density of an earth formation penetrated by a borehole, the method comprising the steps of: (a) inducing gamma radiation within said formation by means of a neutron source (see col. 2, lines 42-49 and col. 3, line 65 to col. 4, line 8); (d) measuring gamma ray counts resulting from said induced gamma radiation in said low energy window at a second axial spacing from said neutron source, wherein said second spacing is greater than said first axial spacing and (e) measuring gamma ray counts resulting from said induced gamma radiation in said high energy window at said second axial spacing (see col. 2, lines 42-56 and col. 3, line 65 to col. 4, line 53); (f) computing a normalization factor by dividing said gamma ray counts measured at said first spacing in said high energy window by said gamma ray counts measured at said second axial spacing in said high energy window; (g) computing a normalized gamma ray count for said low energy window at said second axial spacing by multiplying said normalization factor by said gamma ray counts measured in said low energy window at said second axial spacing; (h) computing a low energy window count difference by subtracting said gamma ray count measured at said first axial spacing in said low energy window from said normalized gamma ray count; (i) correcting said low energy window count difference for effects of formation lithology to form a corrected low energy window count difference; and (j) determining said bulk density from said lithology corrected low energy window count difference using a predetermined functional relationship (see col. 2, lines 56-63 and col. 5, line 60 to col. 7, line 7).

Tittman does not disclose (b) measuring gamma ray counts resulting from said induced

gamma radiation in a low energy window extending from about several hundred keV to about 3 MeV at a first axial spacing from said neutron source; (c) measuring gamma ray counts resulting from said induced gamma radiation in a high energy window extending from about 3 MeV to above 7 MeV at said first axial spacing.

Loomis et al. teach (b) measuring gamma ray counts resulting from said induced gamma radiation in a low energy window extending from about several hundred keV to about 3 MeV at a first axial spacing from said neutron source; (c) measuring gamma ray counts resulting from said induced gamma radiation in a high energy window extending from about 3 MeV to above 7 MeV at said first axial spacing (see col. 8, lines 53-54).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Tittman's method to include (b) measuring gamma ray counts resulting from said induced gamma radiation in a low energy window extending from about several hundred keV to about 3 MeV at a first axial spacing from said neutron source; (c) measuring gamma ray counts resulting from said induced gamma radiation in a high energy window extending from about 3 MeV to above 7 MeV at said first axial spacing, as taught by Loomis et al., in order that gamma rays emitted by the radioactive material can be detected.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wilson discloses methods and apparatus for determining gas saturation, liquid saturation, porosity and density of earth formations penetrated by a well borehole.

Stoller et al. disclose an advanced method for determining formation density in an array-detector density tool using three or more detectors to yield an improved accuracy and precision of the formation density measurement even in the presence of a large standoff between the tool and the formation.

Becker et al. disclose a method/apparatus for determining the density of a formation traversed by a borehole having irregularities along the borehole wall preferably employs/includes a housing, a photon source, and a detector.

Badruzzaman discloses an apparatus for measuring the density of a subterranean formation from within a wellbore, especially a cased wellbore.

Evans et al. disclose apparatus for determining the density of underground formations surrounding a borehole, such as a wireline logging tool or a logging-while-drilling tool, including a neutron source for irradiating the formations from within the borehole and at least one detector which detects neutrons and gamma rays in the borehole resulting from the irradiation of the formations with neutrons.

Mickael et al. disclose a method of measuring the density of an earth formation penetrated by a wellbore.

Meisner discloses a computer-based well logging system for acquiring nuclear well log data, including gamma ray energy spectrum and neutron population decay rate data, and providing a real-time preentation of the data on an operator's display based on a traversal by a downhole instrument of a prescribed borehole depth interval.

Evans discloses method and apparatus for radiological investigation of subterranean multicomponent media such as borehole fluids, and subterranean earth formations.

Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol S. Tsai whose telephone number is (703) 305-0851. The examiner can normally be reached on Monday-Friday from 7:30 AM to 4:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703) 308-1677. The fax number for TC 2800 is (703) 308-7382. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2800 receptionist whose telephone number is (703) 308-1782.

In order to reduce pendency and avoid potential delays, Group 2800 is encouraging FAXing of responses to Office actions directly into the Group at (703) 308-7382. This practice may be used for filing papers not requiring a fee. It may also be used for filing papers which require a fee by applicants who authorize charges to a PTO deposit account. Please identify the examiner and art unit at the top of your cover sheet. Papers submitted via FAX into Group 2800 will be promptly forwarded to the examiner.

Carol S. Tsai

06/07/03

Marc S Hoff

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